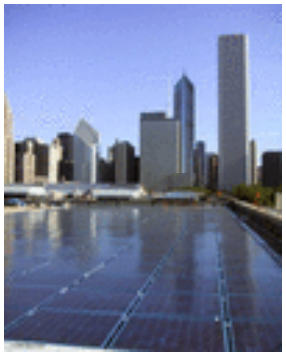
Renewable Energy

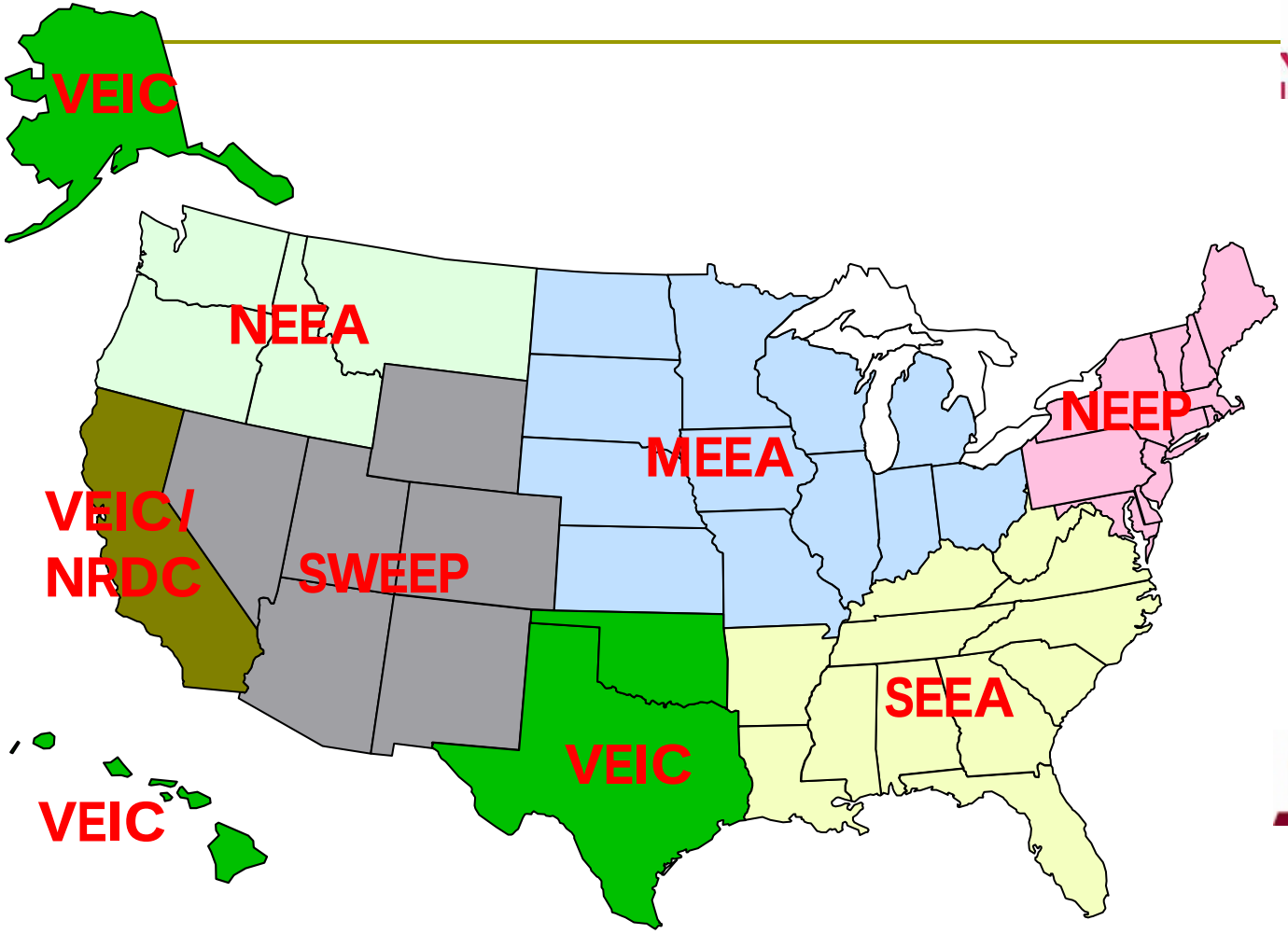

Curtis Framel

SW Energy Efficiency Project

SWEEP

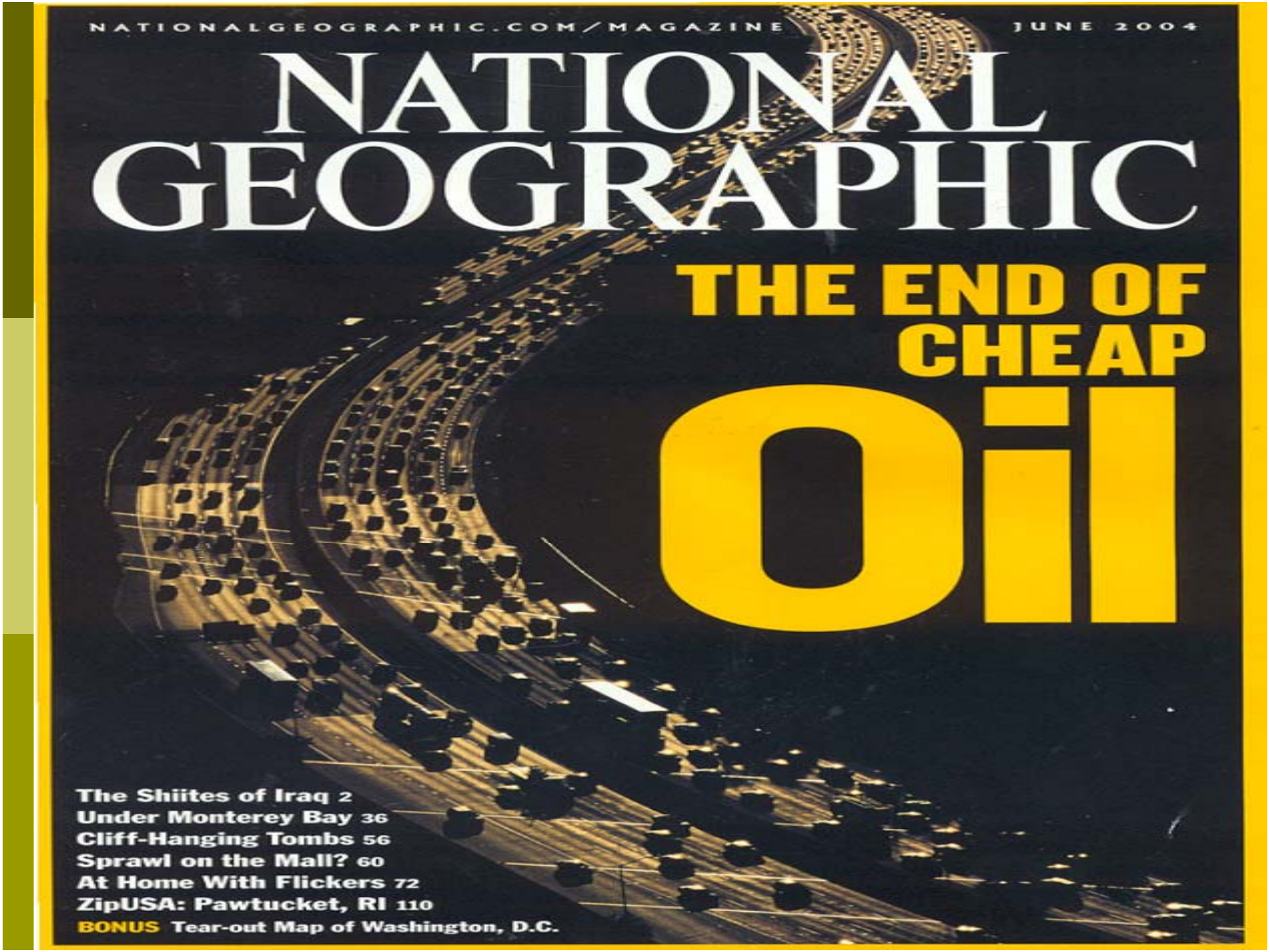
www.swenergy.org

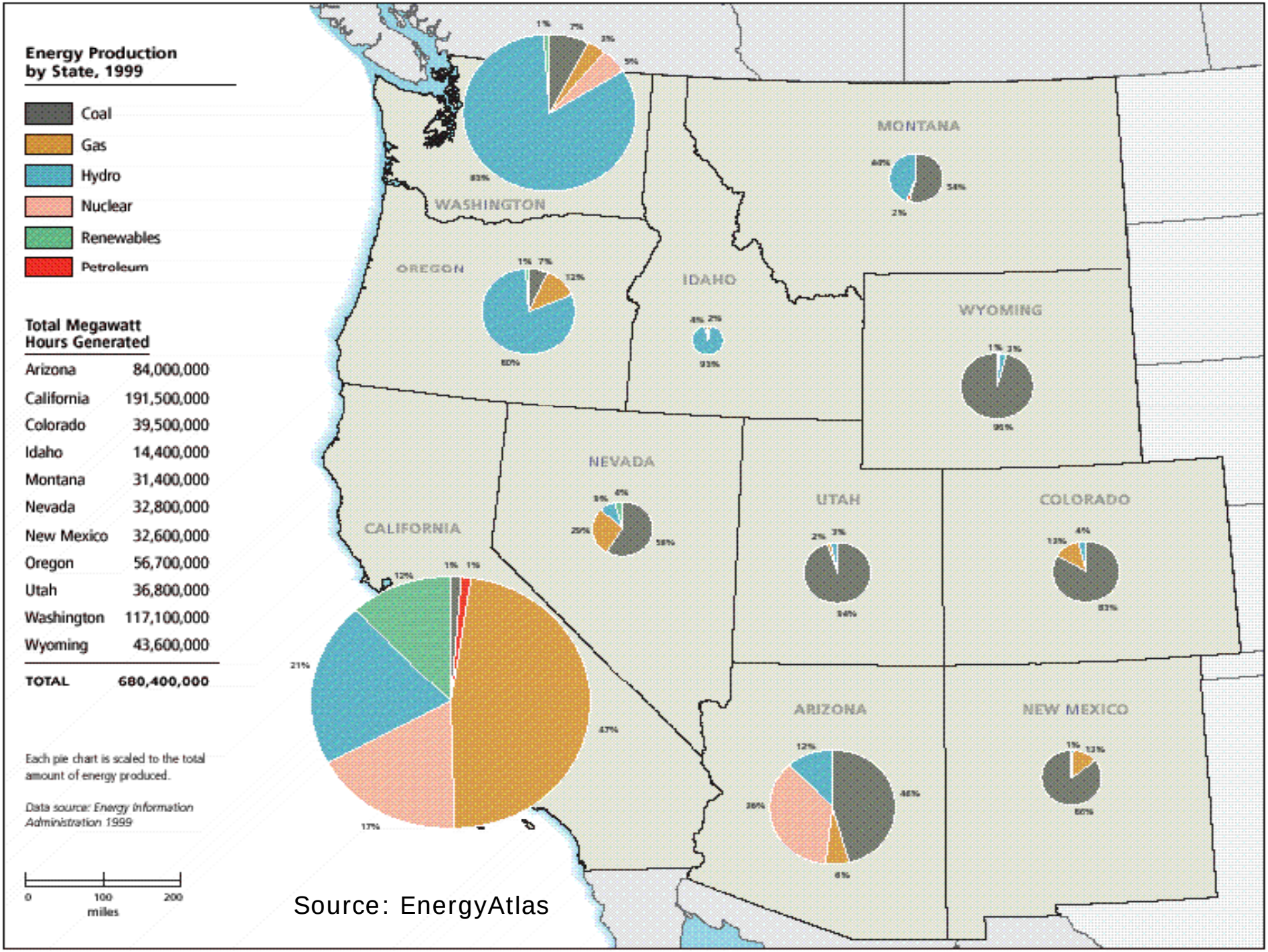
Who We Are: Team 4



ACEEE, NRDC: National Support

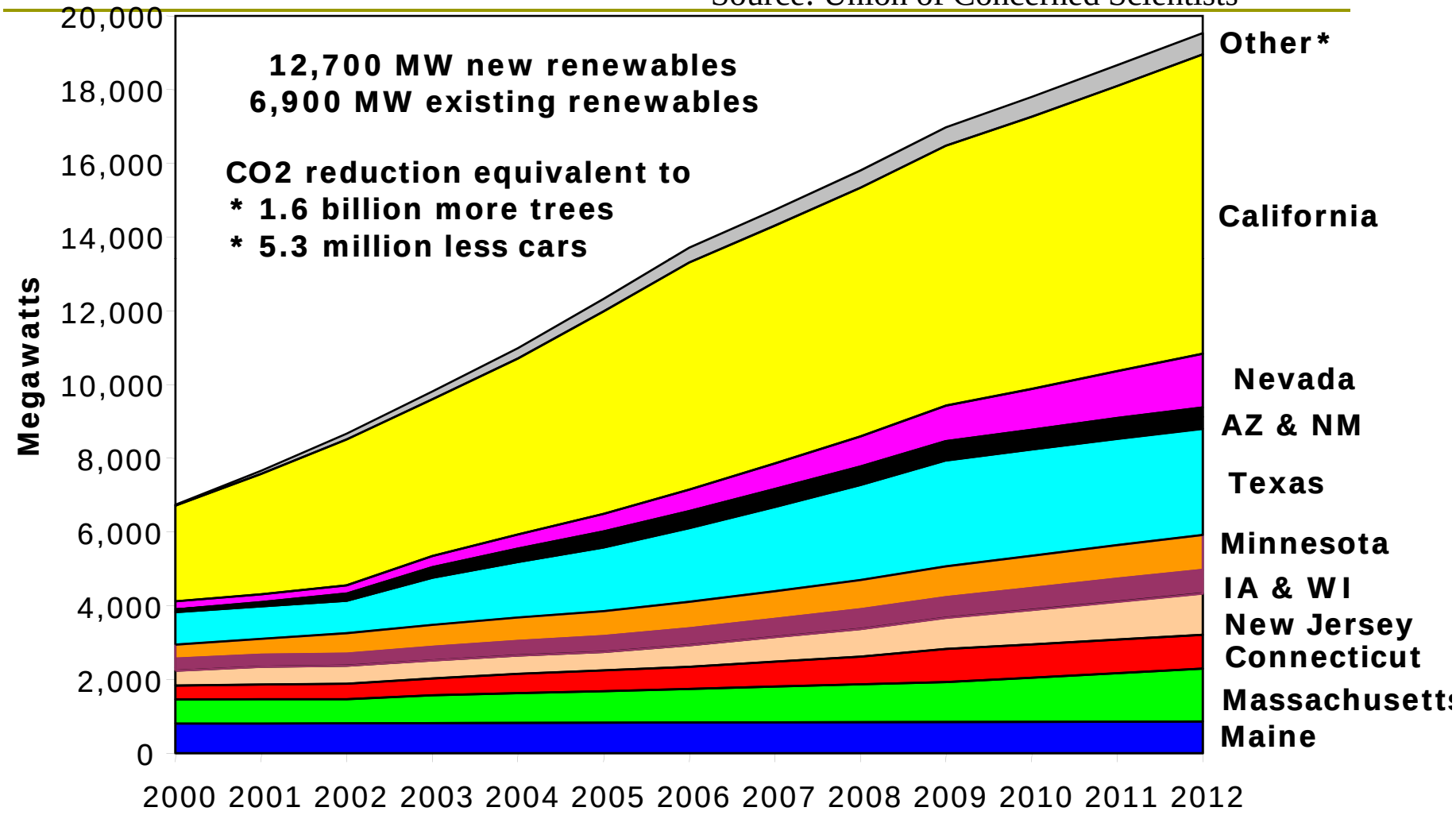

Reynolds
DEER
SEASON
OPEN


NATIONALGEOGRAPHIC.COM/MAGAZINE
JUNE 2004
NATIONAL GEOGRAPHIC
THE END OF CHEAP Oil
The Shiites of Iraq 2
Under Monterey Bay 36
Cliff-Hanging Tombs 56
Sprawl on the Mall? 60
At Home With Flickers 72
ZipUSA: Pawtucket, RI 110
BONUS Tear-out Map of Washington, D.C.


Energy Production by State, 1999
Coal
Gas
Hydro
Nuclear
Renewables
Petroleum
Total Megawatt Hours Generated
Arizona 84,000,000
California 191,500,000
Colorado 39,500,000
Idaho 14,400,000
Montana 31,400,000
Nevada 32,800,000
New Mexico 32,600,000
Oregon 56,700,000
Utah 36,800,000
Washington 117,100,000
Wyoming 43,600,000
TOTAL 680,400,000
Each pie chart is scaled to the total amount of energy produced.
Data source: Energy Information Administration 1999
0 100 200 miles
WASHINGTON
OREGON
CALIFORNIA
IDAHO
NEVADA
MONTANA
WYOMING
UTAH
COLORADO
ARIZONA
NEW MEXICO
Source: EnergyAtlas

Renewables from State RPS & Funding- By 2012

Source: Union of Concerned Scientists

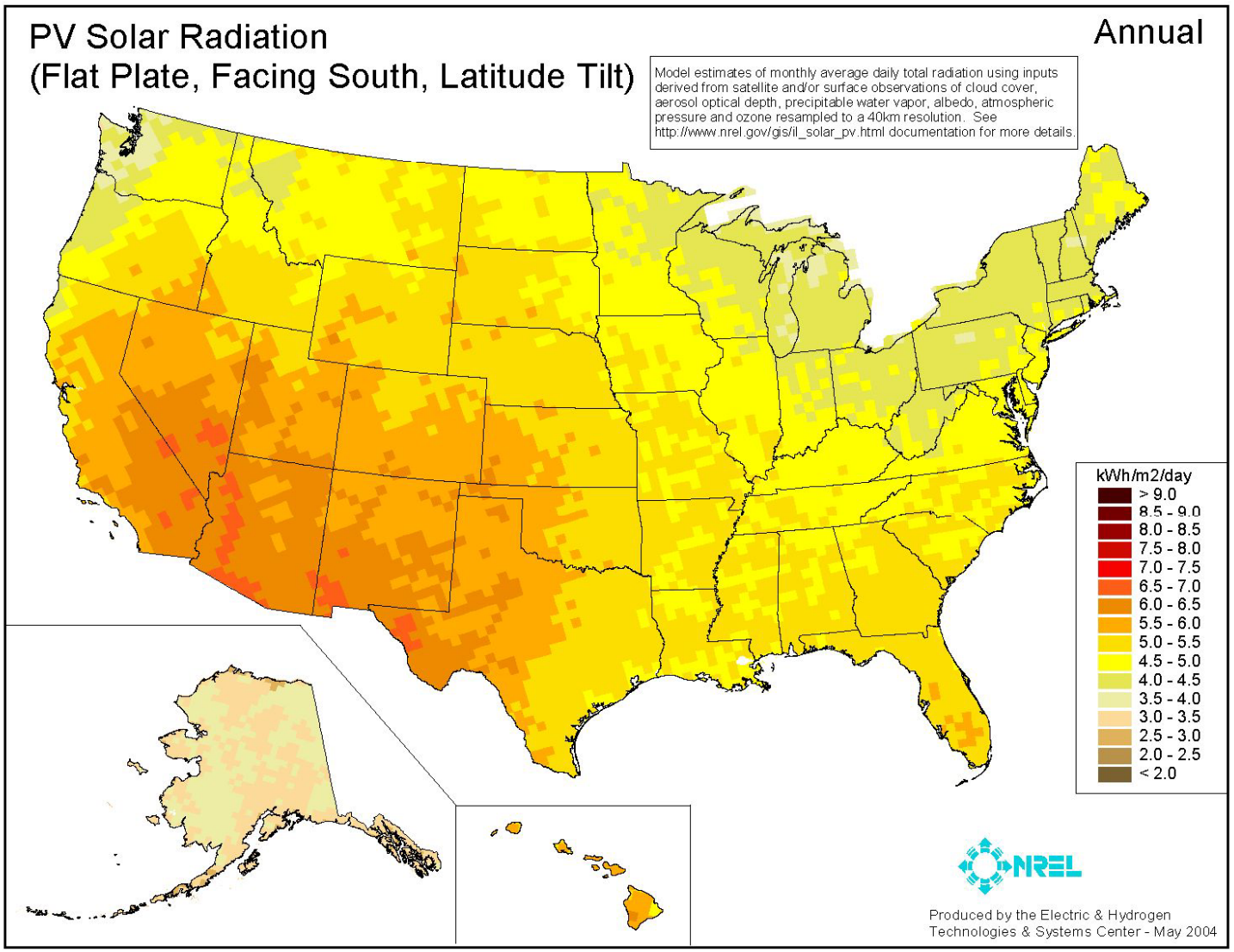


*Includes Illinois, Montana, New York, Oregon, Pennsylvania and Rhode Island.

Renewable Energy - Types

- Solar
- Biomass
  - Biofuels
  - Bioenergy
- Wind
- Geothermal
- Cogeneration

Insolation


PV Solar Radiation
(Flat Plate, Facing South, Latitude Tilt)
Annual
Model estimates of monthly average daily total radiation using inputs derived from satellite and/or surface observations of cloud cover, aerosol optical depth, precipitable water vapor, albedo, atmospheric pressure and ozone resampled to a 40km resolution. See http://www.nrel.gov/gis/il_solar_pv.html documentation for more details.
kWh/m2/day
> 9.0
8.5 - 9.0
8.0 - 8.5
7.5 - 8.0
7.0 - 7.5
6.5 - 7.0
6.0 - 6.5
5.5 - 6.0
5.0 - 5.5
4.5 - 5.0
4.0 - 4.5
3.5 - 4.0
3.0 - 3.5
2.5 - 3.0
2.0 - 2.5
< 2.0
NREL
Produced by the Electric & Hydrogen Technologies & Systems Center - May 2004

Solar Energy Passive/Active

Community Projects

What do we mean by “Community Projects”?

- Community Solar
  - One PV system - many participants
  - Various ownership and metering options
- Community Purchase Programs
  - Many systems – many participants
  - Concept of a “Group Buy”

Examples of Community Solar

Picture of 1 MW PV System installed by the Sacramento Municipal Utility District (SMUD)
Photo is from the Guide to Community Solar

Why Community Solar?

There are many potential interested buyers of solar who

are unable to install a PV system on their roof

Why?

- They rent
- They own a condo
- Their roof is shaded
- Their roof does not have the proper orientation
- They are not allowed (HOA restrictions)
- They can't afford an entire system
- They want to "dip their toe in the water"

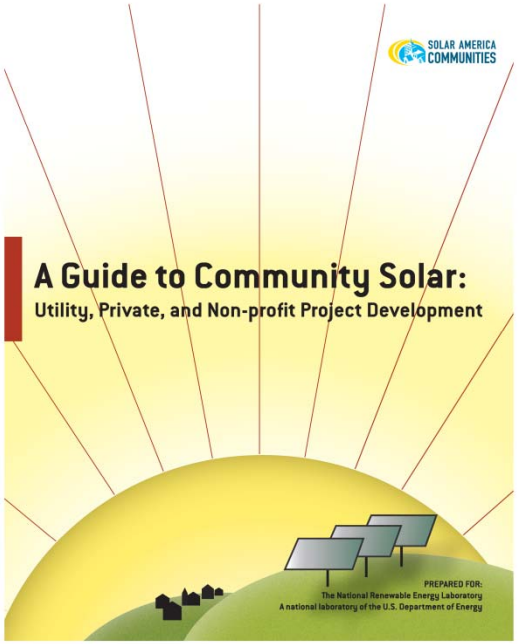
Source of photo: http://www.smud.org/en/residential/trees/Pages/index.aspx

Picture of 78 kW PV System installed by the Clean Energy Collective, LLC, Colorado
Photo is from the Guide to Community Solar

Guide to Community Solar

Collaborative effort

- U.S. Department of Energy Solar America C
- NREL
- Bonneville Environmental Foundation
- NWSEED
- IREC
- Stoel Rives, LLP.



Focus

- Project Structures
- Tax and Legal Implications
- Case Studies
- Worksheets
- IREC Model Community Energy Rules

Where to find it:

- U.S DOE's Solar America Communities web
- http://www.solaramericacommunities.energy.gov

Guide for Group Buy Programs

The Solarize Handbook:

A Guide for Community Aggregated Purchases of Residential Photovoltaic Installations

Details

- Will be available on the Solar America Communities website (January 2011)
- Authored by NWSEED for the City of Portland under the auspices of the DOE's Solar America Communities program.

Content

- Background on the Group Buy Concept
- Case Studies
- Lessons Learned and Considerations
- Step by Step "How To" Guidelines
- Additional Resources

City of Portland, OR Solar Energy Program: http://www.portlandonline.com/bps/index.cfm?c=43478&

Northwest Sustainable Energy for Economic Development (NWSEED): http://nwseed.org/

Multifaceted Incentive Program

GoSolarSF

San Francisco's PV incentive program is designed to accomplish many municipal goals.

Residential Incentives **Installers must participate in workforce development program**		
Base Incentives - Applicants choose one:		
Basic	Applies to all qualifying installations	$2,000
Environmental Justice	CARE customers, CALHome enrollees, residences in 94107 & 94124 zip codes	$3,000
Supplemental Incentives - Applicants choose one or both:		
Low-Income	For applicants below median income	$7,000
City Installer	Installer's principal business office located in San Francisco	$750
Business Incentive **Installers must participate in workforce development program**		
Business	$1,500 per kW of installed solar capacity	Up to $10,000
Non Profit Incentives **Installers must participate in workforce development program**		
Nonprofit	Property operated by a non-profit organization and owned by a nonprofit or government entity	$1,500/kW no cap.
Nonprofit-Residential	Multi-unit residential property owned & operated by a non-profit organization or by a for-profit affordable housing provider	$3,500/kW Up to $60,000

http://sfwater.org/mto_main.cfm/MC_ID/12/MSC_ID/139/MTO_ID/361

Wind Energy

Small (≤10 kW)

- Homes
- Farms
- Remote Applications

Intermediate (10-250 kW)

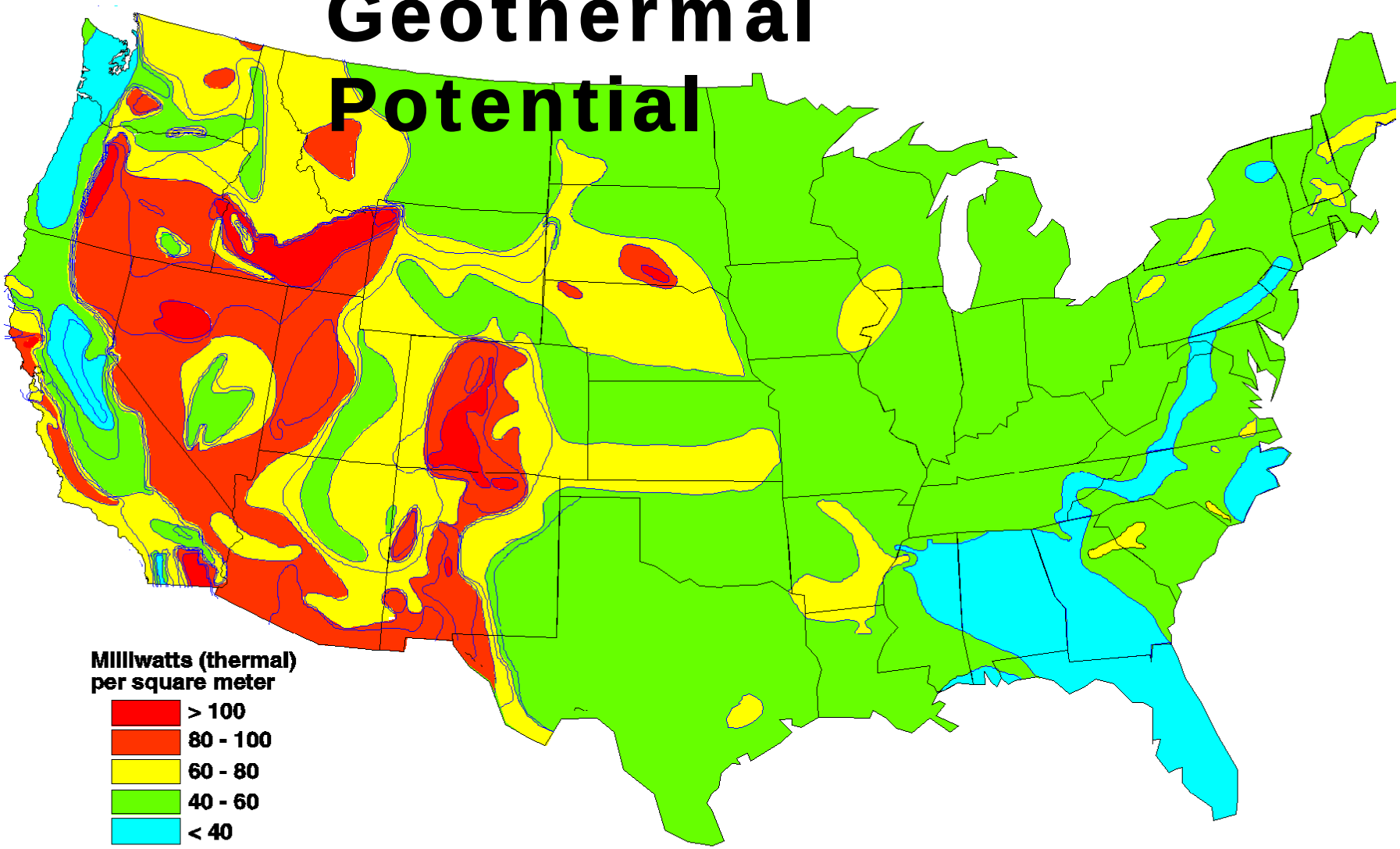
- Village Power
- Hybrid Systems
- Distributed Power

Large (250 kW - 2+MW)

- Central Station Wind Farms
- Distributed Power


Crop of the
21ST Century
U.S. Department of Energy
Wind Energy Program
http://www.eren.doe.gov/wind/
Photo provided by Clean Water Action Alliance
WIND POWERING AMERICA
http://www.eren.doe.gov/
windpoweringamerica/

Geothermal Potential



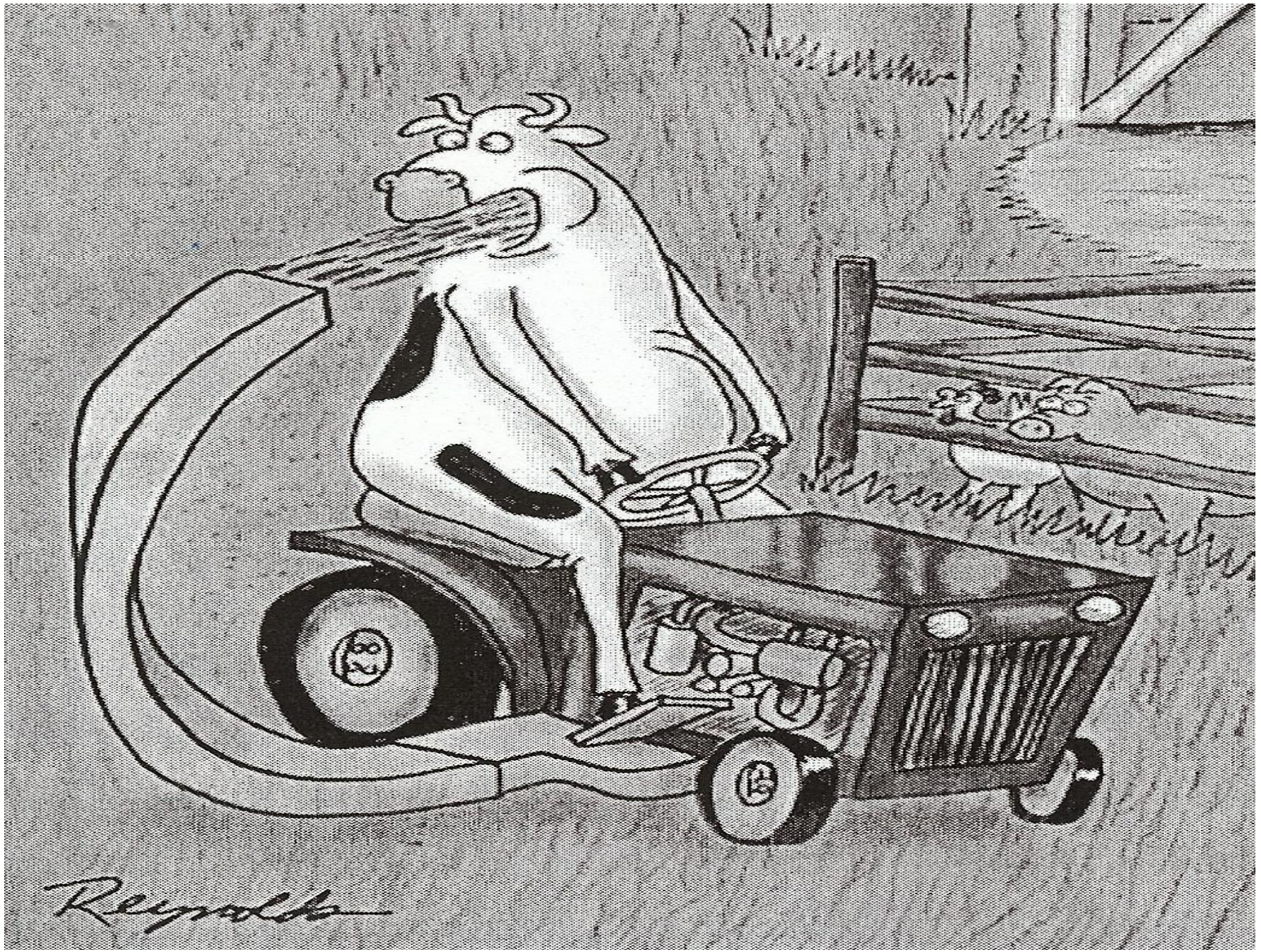
Local and Regional Economic Development

- District Heating
- Distributed Power
- Process Heat
- Agriculture

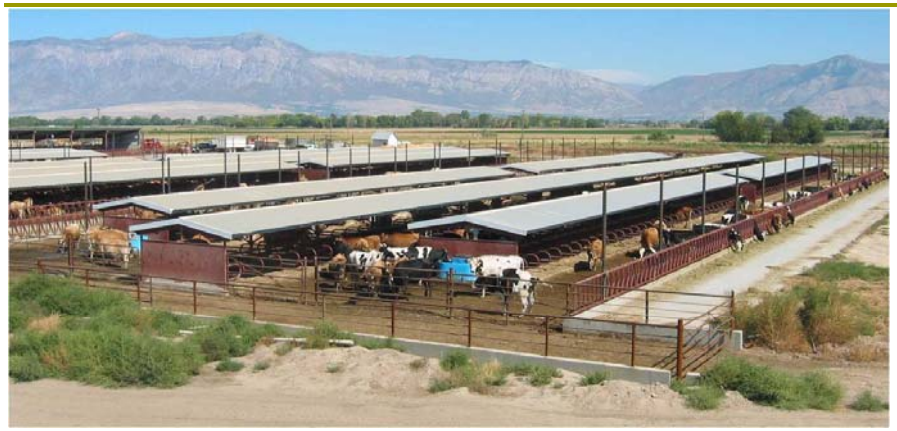
Types of Geothermal Energy

Ground-source heat pumps

Use the earth's nearly constant temperature (50°F to heat and cool buildings


Reynolds

Biomass/Biofuels/Biogas



Dairies and feedlots

Wastewater treatment

Breweries and food processing

Wood waste

Landfill gas

...and many others!

Recycled Energy

- Converting waste heat from industrial processes to electricity
- Fuel-free, emission-free, carbon-free
  - Just as pristine as wind and solar
- Allows the industrial sector to participate in the clean energy economy
  - Instead of being penalized by it

Recycled Energy Recognized as Renewable

- RPS in CO, CT, MA, MI, NC, ND, NV, OH, PN, SD, UT, WV (and growing)
- EERS in AZ
- Tax credits in NM, NJ
- Utility DSM/EE programs (various)

Example: Highline Electric Association
(Northeastern CO, 4 MW)

- NOTE: Co-ops have access to a very thorough potential study (by city, state, zip, co-op, facility name, est. MW) – by NRECA/CRN

Permitting Resources

- Net Metering
  - IREC Net Metering Model Rules: http://irecusa.org/fileadmin/user_upload/ConnectDocs/IREC_NM_Model_October_2009-1.pdf
  - “Group” rules: See examples from VT, CA, MA, ME, WA at DSIRE: http://www.dsireusa.org
- Model Interconnection Procedures
  - IREC: http://irecusa.org/wp-content/uploads/2010/01/IREC-Interconnection-Procedures-2010final.pdf
  - EPA:http://www.epa.gov/statelocalclimate/documents/pdf/guide_action_chap5_s4.pdf
- Model Ordinances
  - Oregon: http://www.oregon.gov/ENERGY/SITING/local.shtml
  - Pace Law Library: http://libraryguides.law.pace.edu/content.php?pid=47949&sid=1022374
  - DSIRE: http://www.dsireusa.org

Don't Forget the Big Picture!

- Renewable energy is a key low-carbon, domestic energy source.
- Energy efficiency (and demand response) is usually the least expensive way to respond to growing energy needs.
- Both technologies are key for addressing energy independence, energy security, green jobs, and climate change.

Resources

- **Developing an Effective State Clean Energy Program: Clean Energy Loans**
- Clean Energy States Alliance. March 2009.
- The Clean Energy Group (CEG) runs the Clean Energy States Alliance (CESA), which is a nonprofit organization with members from states with clean energy funds and state agencies. CESA provides information and technical services to its members and works with them to build and expand clean energy markets in the United States. This paper summarizes innovative grant-making approaches and practices that have worked effectively for clean energy programs at the state level.
- **Developing an Effective State Clean Energy Program: Renewable Energy Incentives**
- Clean Energy States Alliance. March 2009.
- This paper summarizes innovative approaches and practices that have worked effectively for providing small renewable project incentives at the state level.
- **Solar Photovoltaic Financing: Residential Sector Deployment**
- National Renewable Energy Laboratory. March 2009.
- This report presents the information that homeowners and policy makers need to facilitate PV financing at the residential level. The full range of cash payments, bill savings, and tax incentives is covered, as well as potentially available solar attribute payments. Traditional financing is also compared with innovative solutions, many of which...
- **Solar Leasing for Residential Photovoltaic Systems**
- National Renewable Energy Laboratory. February 2009.
- This publication examines the solar lease option for residential PV systems and describes two solar lease programs already in place. As a result of the $2,000 cap on the residential ITC being lifted in 2009, the expansion of the solar lease model across the United States may be slower than anticipated. The lease model, though, still offers homeowners some distinct advantages. This publication helps homeowners revisit the comparison between the solar lease and home-equity financing in light of the change to the ITC.
- **Case Studies of State Support for Renewable Energy: Designing PV Incentive Programs to Promote Performance: A Review of Current Practice**
- Lawrence Berkeley National Laboratory. October 2006.
- This report examines PV incentive programs aimed at promoting PV system performance including (but not limited to) performance-based incentives (PBI) used in 32 states across the country.

- Links to all available at DOE's Solar America Cities site: http://www.solaramericacities.energy.gov/resources/guide_for_local_governments/2/1/

Example of Program Portfolio

Financial Incentives – State of California (from DSIRE)

Industry Recruitment/Support

- Sales Tax Exemption for Alternative Energy Manufacturing Equipment

PACE Financing

- Local Option - Municipal Energy Districts

Performance-Based Incentive

- California Feed-In Tariff

Property Tax Incentive

- Property Tax Exclusion for Solar Energy Systems

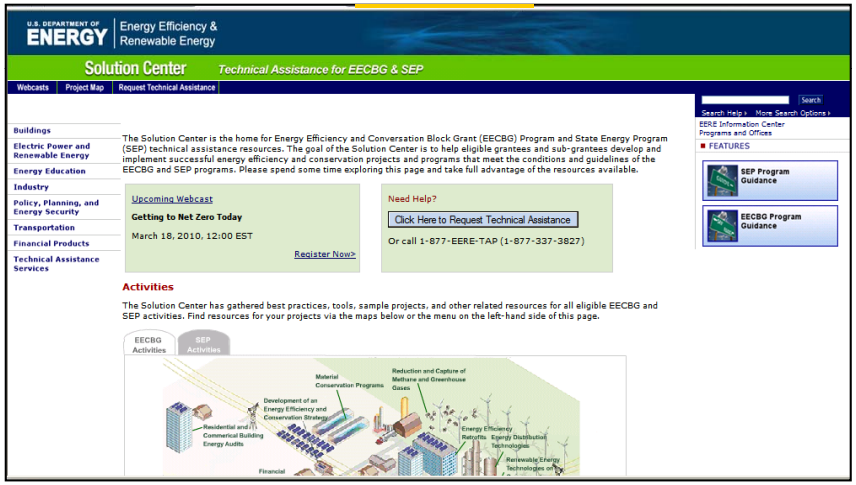
State Rebate Program

- California - Energy Efficient Appliance Rebate Program
- California Solar Initiative - Multi-Family Affordable Solar Housing (MASH) Program
- California Solar Initiative - PV Incentives
- California Solar Initiative - Single-Family Affordable Solar Housing (SASH) Program
- California Solar Initiative - Solar Water Heating Rebate Program
- CEC - New Solar Homes Partnership
- Emerging Renewables Program
- Self-Generation Incentive Program

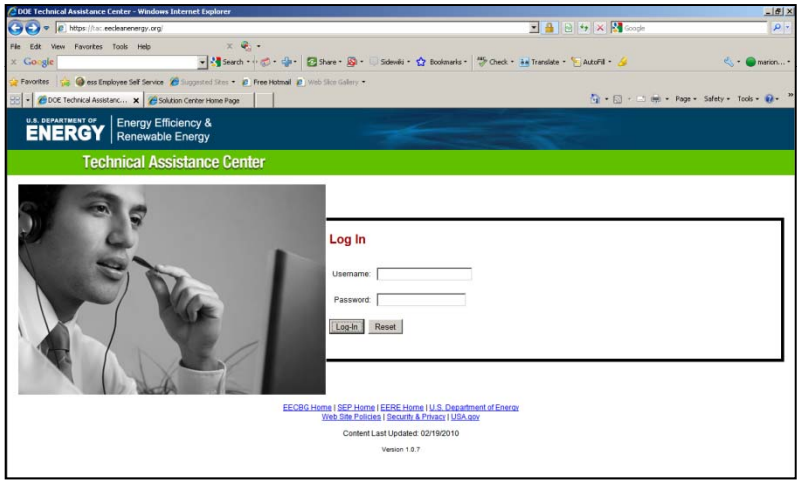
Accessing TAP Resources

We encourage you to:

1) Explore our online resources via the Solution Center



2) Submit a request via the Technical Assistance Center



3) Ask questions via our call center at 1-877-337-3827 or email us at solutioncenter@ee.doe.gov

INTRODUCE

SPEAKERS